f/ Ellis Property

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Scituate, Massachusetts
Weston & Sampson Project No. 2130056.A

March 21, 2013

Mr. Albert G. Bangert
DPW Director
Town of Scituate, Town Offices
600 Chief Justice Cushing Highway
Scituate, Massachusetts 02066

Re: Mann Lot Road Sewer Feasibility Study
Letter Report

Dear Mr. Bangert:

Weston & Sampson has reviewed available information and performed site evaluations and we are pleased to submit this Letter Report regarding the Mann Lot Road Sewer Feasibility Study. This letter summarizes our evaluation, including limited analysis of existing system capacity, preparation of a preliminary sewer layout and cost estimate, identification of potential permits, and conclusions.

Introduction

The Town of Scituate is looking to evaluate the feasibility and recommended means of extending the existing sewer collection system from the First Parish Pump Station to a site at the intersection of Mann Lot Road and Chief Justice Cushing Highway (Route 3A), for the potential purpose of relocating the existing Scituate Police and Fire Stations. This letter report is intended to examine the feasibility and cost effectiveness of potential sewer connection options.

Background

The existing First Parish Pump Station (FPPS) is located on First Parish Road at the intersection with the Access Road driveway to the Town Offices, Police Station, and Fire Station. The station was constructed in 1979 and consists of a wet well/dry well type pump station. The two pumps are located below grade in an 8-foot diameter steel pump chamber with the pump control panel. Based on available record drawing information, the pumps have 30 horsepower (hp) motors rated at 275 gallons per minute (gpm) against a total dynamic head (TDH) of 100 feet. The duplex pump system draws the wastewater from an adjacent 8-foot diameter concrete wet well. The pump station collects wastewater from the Town Offices, Police Station, Fire Station, High School, and the Cushing School. An additional inlet pipe to the wet well (towards First Parish Road) has been installed for a potential future extension in this area (currently capped). The pump station discharges flow via a 6-inch ductile iron force main approximately 3,400 linear feet along First Parish Road to an existing sewer manhole just east of Country Way, at the First Parish Church. Flows are then conveyed via gravity sewer along Beaver Dam Road, ultimately to the Scituate Wastewater Treatment Facility. A standby generator with automatic transfer switch is located above grade in a weatherproof enclosure.

Wastewater Flows

As part of this evaluation, a wet well draw down test was performed on one of the pumps to estimate the average pump rates of the existing pumps. The draw down test revealed an estimated pump rate of approximately 320 gpm for the pump that was running during the test (one minute to draw down 0.85 feet

in the 8-foot diameter wet well). The influent flow to the wet well during the pump station draw down test was insignificant.

As noted above, the existing facilities tributary to the FPPS include the Town Offices, Police Station, Fire Station, High School, and the Cushing School. Several years of pump run time records for the pump station were received from the town and analyzed for this report (see Appendix A). Based on the run time records for this station over the past three years, the pumps ran for an average of 11 hours per month, which translates to approximately 22 minutes per day. Based on the estimated capacity of 320 gpm for each pump determined by the wet well draw down test, the estimated average daily flow handled by this station over the past three years is approximately 7,000 gallons per day (gpd), or 5 gpm. The maximum daily flow event during the past three years occurred in March 2010, coinciding with a significant rain event. During this month, the pumps ran for 24.9 hours, or approximately 50 minutes per day. Based on the estimated pump output of 320 gpm, the maximum daily flow was approximately 16,000 gpd (11.1 gpm). With a peaking factor of 5.6, the peak flow is approximately 39,200 gpd (7,000 X 5.6), or 27 gpm, which is still well below the design capacity for the station shown on the record drawings (275 gpm) and the capacity estimated during the draw down test (320 gpm).

Based on the capacity analysis performed, the station is adequately sized for the current flows and appears to have been sized for significant future flows. Based on the above detailed peak flow of 27 gpm currently being conveyed to the station, there is approximately 293 gpm of remaining peak capacity available at the pump station (320-27), which equates to an average daily flow of approximately 52 gpm (293/5.6), or 74,900 gpd.

Proposed Sewer Alignment

The first alignment considered for any proposed sewer extension would be the shortest route within the public right-of-way of Chief Justice Cushing Highway (Route 3A). This alignment would start at the existing FPPS, continue west along First Parish Road, then north on Chief Justice Cushing Highway to the intersection of Mann Lot Road (see Figure 1). The length of the proposed route is approximately 5,830 linear feet. Since this alignment would be entirely within the public right-of-way, environmental impacts and impacts to private property would be avoided, with the exception of potential work within the 100-foot buffer zone of bordering vegetated wetlands. The major drawbacks of this alignment are the traffic impacts and the costs associated with pavement restoration and traffic safety details within the State Highway layout of Route 3A. Significant cost savings could be realized if the sewer line could be installed in the shoulder of the road, outside of the limits of the paved surface. Based on our limited reconnaissance, such an alignment is not likely feasible for most of the proposed length. Another option that would likely result in cost savings would be to route the sewer behind the Town Hall and reduce the length of work in the State Highway. For the purpose of this study, we have taken the conservative approach and assumed the entire length of pipe will be installed on the public right-of-way.

Collection System Alternatives

The major factors affecting collection system design are topography and, as always, cost. A conventional gravity sewer relies on a steady decrease in elevation to convey wastewater from a higher elevation to a lower elevation. When grades or excavation depths become excessive or cost prohibitive, mechanical means are typically introduced to lift wastewater flows from a lower elevation to a higher one. This can be accomplished by 1) running gravity sewers to a central pumping station at a common low point and discharging through a dedicated force main or 2) through the use of multiple pumps at various elevations and locations, pumping into a common low-pressure sewer.

Gravity Sewer

The grade on Chief Justice Cushing Highway, between the FPPS and Mann Lot Road, is fairly flat for the initial 1,000 to 1,200 feet from the pump station, before increasing substantially the rest of the way to the

intersection of Mann Lot Road, which seems to lend itself to a conventional 8-inch gravity sewer at relatively shallow depths. Due to a slight low-point in topography approximately 400 feet from the FPPS, the use of pipe insulation and/or thicker walled pipe may be necessary due to reduced cover (less than 4 feet).

Gravity Sewer with Central Pumping Station
Considering the viability of a gravity sewer, constructing a municipal wastewater pump station for such minor wastewater flows is not practical or economical, therefore this alternative was not considered.

Low Pressure Sewer with Grinder Pumps
This alternative involves the use of individual grinder pumps (or a combined duplex grinder pump system) for the proposed relocated Police Station and the Fire Station at Mann Lot Road, and a common 2-inch low-pressure sewer at a depth of approximately 5 feet along the pipe alignment, tying into the gravity sewer manhole just upstream of the FPPS wet well. With a viable gravity alternative, the primary advantages of this alternative would be lower capital costs and potential growth control based on limited pipe capacities (if growth or WWTF capacity are a concern).

Permits
No significant wetlands habitat impacts are anticipated as part of the project, however a Notice of Intent (NOI) filing with the DEP and the local Conservation Commission will be required for work in buffer zone areas. According to available mapping, the proposed alignment must cross at least one small stream/culvert near #626 Chief Justice Cushing Highway.

Based on current regulations, sewer extensions of greater than or equal to 1,000 feet must obtain a Department of Environmental Protection (DEP) permit before construction, therefore, based on the length of the proposed extension a Sewer Extension Permit will be required for the project. It should be noted that revisions to the current DEP sewer extension regulations are currently being considered, which could preclude this project from the requirements if approved.

Chief Justice Cushing Highway (Route 3A) is classified as a State Highway, therefore an Access permit will be required from the MassDOT for work within the State Highway layout.

Cost Summary
An estimated cost has been developed for the two identified viable alternatives for purposes of comparison and for use in making final recommendations. Factors that affect the cost of linear pipeline projects of this nature include, but are not limited to:

- Size and depth of pipe
- Number of manholes/structures
- Subsurface conditions
- Method of installation (open cut vs. trenchless)
- Surface Restoration
- Public Safety Details
- Land Acquisition/Legal Assistance (N/A for this project)

In addition to pipe size and depth, which have been previously discussed for both alternatives, one of the most important cost drivers impacting the construction of any wastewater collection system is the existing subsurface conditions. Because this is a conceptual design, geotechnical investigations were not performed and certain assumptions were made with regard to ledge, unsuitable soils, high groundwater, etc.

The method of construction is also a contributing factor to the overall cost of a project. For both of the alternatives, we considered the possibility of utilizing trenchless technologies (i.e. - horizontal direction drilling) instead of conventional open-cut methods. Horizontal directional drilling (HDD) is most effective for the installation of long lengths of pressure pipe in non-congested areas where there are favorable subsurface conditions, limited existing underground utilities, and limited service connections required. Based on this, we ruled out the gravity option for this technology. For the pressure sewer option it is possible that most, if not all, of the pipeline could be installed using HDD, with limited open-cut excavations required to 1) excavate entry and exit pits for the drilling operations, 2) connect the service connections to the mainline and, in some instances, 3) confirm depth of existing underground utilities. Due to the uncertainty of existing underground utilities and the lack of subsurface data available at this time, however, we provided cost estimates for both open cut and HDD pipeline installation methods to depict a range of possible construction costs.

Another major factor that impacts costs is the final surface restoration of the trenches. With this in mind, we explored the option of using the shoulders of the roads instead of the centerlines for open cut installations, thereby minimizing or eliminating pavement replacement requirements. Based on our limited reconnaissance, however, such an alignment is not likely feasible for most of the proposed length and, therefore, we have assumed that all open cut installations will be beneath the paved surface of the roads.

Due to shallow excavations and the ability to maintain narrow trench widths, it was assumed that excavations would be trench patched in lieu of full width resurfacing. This would entail temporary trench pavement, 2-inch trench-width binder pavement and 1 ½-inch trench-width top course pavement. It was further assumed that sewer in the state highway would require the following:

- Control density fill (CDF) as trench backfill to within seven inches of the existing ground surface
- 4-inch trench-width black base pavement course
- 1 ½-inch trench-width binder course
- 1 ½-inch trench-width top course

Although CDF has typically been required in all State Highway trenches, a waiver of this requirement can be requested during the State Highway permit application process and was granted under the Greenbush/Reservoir Sewer Extension Project for work in Chief Justice Cushing Highway adjacent to the Water Treatment Plant. Considering this possibility and the significant cost of CDF, the costs generated for gravity sewer were prepared both with CDF included, as well as without CDF (assuming a waiver of the requirement would be granted by MassDOT).

Another significant expense on a project of this nature is related to public safety (i.e. – police details). Based on our understanding of the Town's policies with regard to police details and the "high traffic" project area, we have assumed 3 police officers (24 hours) per day at $45 per hour with the following assumptions for pipeline production:

- Gravity Sewer – 80 feet per day
- Pressure Sewer – 200 feet per day
- HDD – 500 feet per day

Based on the above criteria, preliminary planning level cost estimates were prepared for the various scenarios discussed, including engineering costs (design, permitting, and construction services) and contingencies, and are summarized below (see Appendix B for detailed cost estimate tables):

Alternative	Estimated Construction Cost
1. Gravity Sewer (with CDF)	$1,920,000
2. Gravity Sewer (without CDF)	$1,500,000
3. Low Pressure Sewer/Grinder Pump (Open cut with CDF)	$1,400,000
4. Low Pressure Sewer/Grinder Pump (Trenchless - HDD)	$680,000

Conclusions

As anticipated, the less expensive alternatives involve construction of low-pressure sewers, primarily due to the shallow excavations and flexibility of construction associated with this technology. It is important to note, however, that although the estimated capital construction costs of gravity sewer are higher, this alternative would eliminate the need for mechanical equipment and the associated long term operation and maintenance costs. The gravity sewer alternative would also allow for a less complex connection of future flows, if applicable, since future connections to a low-pressure sewer would be limited by the small diameter pipe.

As evidenced above, the biggest cost drivers affecting this project are method of backfill in the State Highway (with CDF vs. without CDF) and method of installation (open cut vs. trenchless), which result in a wide range of estimated capital costs. Based on our experience, we believe that the CDF waiver is likely and the ability to use trenchless technology will be dependent upon final design data. For these reasons, we recommend the Town move forward with the following conceptual preliminary costs:

- Gravity sewer - $1.5M
- Low-pressure sewer - $1.0M

The town will ultimately need to review each alternative carefully and determine which option best fits this application. If you have any questions or comments regarding this study, please give Steve Pedersen or me a call.

Very truly yours,

WESTON & SAMPSON ENGINEERS, INC.

Michael E. Paulin, P.E.
Project Manager

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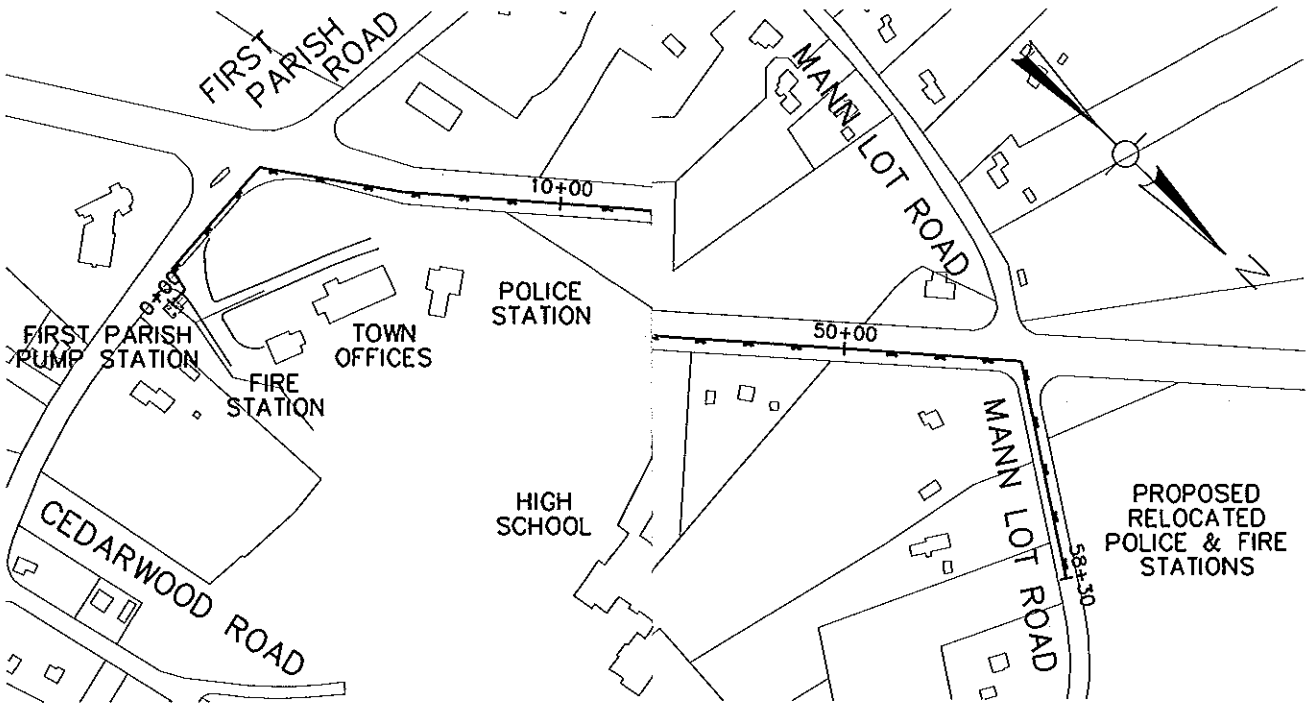

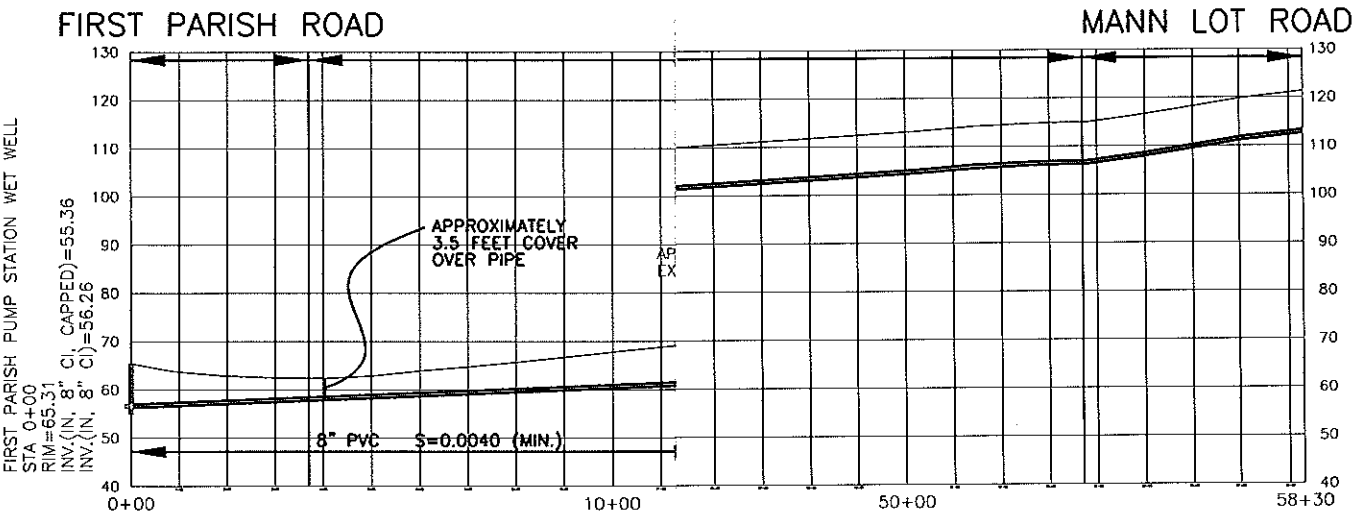

FIGURE 1

TOWN OF SCITUATE, MASSACHUSETTS
CJC HIGHWAY (ROUTE 3A) SEWER FEASIBILITY STUDY

EXISTING ROADWAY PROFILE

DESIGNED BY: MEP	CHECKED BY: SKP	DATE: MARCH 2013

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APPENDIX A
PUMP STATION RUN TIME DATA
(FIRST PARISH PUMP STATION)

Scituate DPW-Sewer Division

Month/Year	Rainfall (inches)	Pump Run Time (hours)	Flow (MGD) (est 265 gpm)
1998			
March	5.98	42.7	0.679
1999			
August	2.57	5.0	0.080
2000			
Jan.	4.29	13.6	0.216
Feb.	2.98	17.1	0.272
March	5.08	31.1	0.494
April	6.44	16.9	0.269
May	2.53	18.0	0.286
June	5.24	10.9	0.173
July	6.90	12.9	0.205
Aug.	7.24	4.7	0.075
Sept.	2.72	12.4	0.197
Oct.	3.42	12.6	0.200
Nov.	3.98	15.2	0.242
Dec.	3.38	9.1	0.145
Averages	***4.52***	***14.5***	***0.231***
2001			
Jan.	3.48	11.2	0.178
Feb.	3.25	11.2	0.178
March	12.24	27.0	0.429
April	1.30	26.4	0.420
May	2.07	12.7	0.202
June	6.75	10.6	0.169
July	2.52	9.5	0.151
Aug.	5.18	2.4	0.038
Sept.	2.30	10.6	0.169
Oct.	0.62	12.1	0.192
Nov.	0.62	12.0	0.191
Dec.	3.27	9.2	0.146
Averages	***3.63***	***12.9***	***0.205***
2002			
Jan.	4.03	10.6	0.169
Feb.	2.25	7.4	0.118
March	5.01	10.8	0.172
April	2.10	10.2	0.162
May	6.10	15.4	0.245
June	4.33	10.3	0.164
July	2.99	3.5	0.056
Aug.	2.08	5.8	0.092
Sept.	4.41	11.3	0.180
Oct.	3.60	14.0	0.223
Nov.	7.41	9.7	0.154
Dec.	6.64	9.0	0.143
Averages	***4.25***	***9.8***	***0.156***
2003			
Jan.	2.81	11.9	0.189
Feb.	4.46	8.6	0.137
March	6.16	11.8	0.188
April	6.71	16.7	0.266
May	3.50	10.8	0.172
June	5.08	9.1	0.145
July	4.00	3.7	0.059
Aug.	6.00	4.4	0.070
Sept.	1.83	9.1	0.145
Oct.	5.89	10.3	0.164
Nov.	2.56	8.1	0.129
Dec.	5.83	8.0	0.127
Averages	***4.57***	***9.4***	***0.149***
2004			
Jan.	1.58	8.9	0.142
Feb.	1.98	7.5	0.119
March	3.18	9.9	0.157
April	7.16	11.4	0.181
May	3.54	10.1	0.161
June	2.90	8.2	0.130
July	3.58	3.5	0.056
Aug.	4.33	3.5	0.056
Sept.	7.16	10.3	0.164
Oct.	2.00	9.3	0.148
Nov.	4.10	8.4	0.134
Dec.	4.69	9.7	0.154
Averages	***3.85***	***8.4***	***0.133***
2005			
Jan.	4.65	10.9	0.173
Feb.	2.61	10.1	0.161

Scituate DPW-Sewer Division

Month/Year	Rainfall (inches)	Pump Run Time (hours)	Flow (MGD) (est 265 gpm)
March	5.98	14.8	0.235
April	3.76	11.5	0.183
May	6.51	12.2	0.194
June	1.39	9.3	0.148
July	4.00	4.2	0.067
Aug.	7.84	4.2	0.067
Sept.	3.43	10.3	0.164
Oct.	14.20	14.9	0.237
Nov.	7.22	13.3	0.211
Dec.	3.27	13.6	0.216
Averages	***5.41***	***10.8***	***0.171***
2006			
Jan.	6.05	15.3	0.243
Feb.	2.89	13.2	0.210
March	0.34	11.5	0.183
April	1.34	7.5	0.119
May	15.76	22.7	0.361
June	13.53	19.6	0.312
July	3.20	5.4	0.086
Aug.	3.33	5.1	0.081
Sept.	2.64	17.7	0.281
Oct.	3.54	11.8	0.188
Nov.	7.52	13.7	0.218
Dec.	1.72	7.9	0.126
Averages	***5.16***	***12.6***	***0.201***
2007			
Jan.	2.48	10.8	0.172
Feb.	1.50	7.9	0.126
March	7.23	13.2	0.210
April	7.84	16.0	0.254
May	3.28	14.4	0.229
June	2.74	7.9	0.126
July	1.35	4.5	0.072
Aug.	0.22	3.5	0.056
Sept.	3.05	10.3	0.164
Oct.	2.28	12.6	0.200
Nov.	2.85	10.2	0.162
Dec.	5.25	9.2	0.146
Averages	***3.34***	***10.0***	***0.160***
2008			
Jan.	2.53	10.9	0.173
Feb.	7.13	10.4	0.165
March	5.07	14.1	0.224
April	3.19	10.4	0.165
May	1.68	13.5	0.215
June	2.08	8.7	0.138
July	4.32	5.6	0.089
Aug.	4.45	4.0	0.064
Sept.	9.70	13.0	0.207
Oct.	1.43	12.4	0.197
Nov.	5.27	9.5	0.151
Dec.	7.30	11.8	0.188
Averages	***4.51***	***10.4***	***0.165***
2009			
Jan.	4.40	10.4	0.165
Feb.	1.99	10.1	0.161
March	3.87	13.6	0.216
April	5.02	12.4	0.197
May	3.09	14.0	0.223
June	2.99	7.9	0.126
July	7.54	5.3	0.084
Aug.	9.01	4.0	0.064
Sept.	3.11	10.4	0.165
Oct.	7.89	13.8	0.219
Nov.	2.48	9.3	0.148
Dec.	4.81	11.6	0.184
Averages	***4.68***	***10.2***	***0.163***
2010			
Jan.	4.23	12.1	0.192
Feb.	4.52	10.6	0.169
March	12.64	24.9	0.396
April	1.37	15.5	0.246
May	2.39	15.9	0.253
June	1.31	7.7	0.122
July	1.54	3.8	0.060
Aug.	5.36	4.7	0.075
Sept.	3.29	10.2	0.162
Oct.	4.84	11.6	0.184
Nov.	3.28	10.5	0.167

Scituate DPW-Sewer Division

Month/Year	Rainfall (inches)	Pump Run Time (hours)	Flow (MGD) (est. 265 gpm)
Dec.	4.28	10.2	0.162
Averages	***4.09***	***11.5***	***0.182***
2011			
Jan.	4.46	9.5	0.151
Feb.	5.06	20.9	0.332
March	2.79	14.2	0.226
April	4.37	11.7	0.186
May	3.35	14.8	0.235
June	3.47	9.1	0.145
July	2.36	4.1	0.065
Aug.	5.05	4.6	0.073
Sept.	6.50	11.1	0.176
Oct.	7.92	12.7	0.202
Nov.	3.42	10.1	0.161
Dec.	3.97	9.8	0.156
Averages	4.39	***11.1***	***0.2***
2012			
Jan.	2.78	10.3	0.164
Feb.	1.24	10.7	0.170
March	0.79	11.4	0.181
April	2.93	12.2	0.194
May	4.51	11.2	0.178
June	4.27	8.1	0.129
July	3.63	4.7	0.075
Aug.	3.20	8.4	0.134
Sept.	2.74	12.6	0.200
Oct.	2.90	11.1	0.176
Nov.	2.55	10.1	0.161
Dec.	5.45	15.3	0.243
Averages	3.08	***10.5***	***0.2***

APPENDIX B
PRELIMINARY CONSTRUCTION COST ESTIMATES

TABLE 1

ENGINEER'S OPINION OF PROBABLE COST - GRAVITY SEWER WITH CDF

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL AMOUNT
1		SEWERS AND APPURTENANCES, COMPLETE IN PLACE		
1a	5,830	8-inch PVC gravity sewer, 0-12 feet deep, per linear foot	$80.00	$466,400.00
1b	150	Insulation for pipelines, per L.F.	$50.00	$7,500.00
2		PRESSURE SEWERS AND APPURTENANCES		
2a	0	2-inch PVC pressure sewer, per linear foot	$40.00	$0.00
2b	0	Terminal and inline flushing connection and manhole, per structure	$4,000.00	$0.00
3		BUILDING CONNECTIONS		
3a	3	8- x 6-inch wye branches for PVC pipe, each	$250.00	$750.00
3b	0	Tee branches for pressure sewer, each	$200.00	$0.00
3c	0	1 1/2-inch pressure building connections (R.O.W.), per linear foot	$40.00	$0.00
3d	90	6-inch PVC building connections (R.O.W.), per linear foot	$50.00	$4,500.00
4		ROCK EXCAVATION AND DISPOSAL		
4a	250	Rock excavation and disposal, per cubic yard	$100.00	$25,000.00
5		MISCELLANEOUS EARTHWORK		
5a	1,000	Excavation & backfill of unsuitable material, per cubic yard	$25.00	$25,000.00
5b	0	Test Pits, per cubic yard	$50.00	
6		GRAVITY SEWER MANHOLES AND APPURTENANCES		
6a	17	Precast concrete manhole base with standard frame & cover, per manhole	$2,500.00	$42,500.00
6b	136	Precast concrete manhole walls and cones, per vertical foot	$120.00	$16,320.00
7		DEWATERING		
7a	1	Normal Dewatering, lump sum	$10,000.00	$10,000.00
8		PAVEMENT REPLACEMENT (LOCAL STREETS)		
8a	830	Temporary trench pavement, (trench width), per linear foot	$10.00	$8,300.00
8b	830	Permanent pavement, 2-inch binder course (trench width), per linear foot	$15.00	$12,450.00
8c	830	Permanent pavement, 1 1/2-inch top course (trench width), per linear foot	$15.00	$12,450.00
8e	0	Gravel roadway replacement, per linear foot	$10.00	$0.00
9		PAVEMENT REPLACEMENT (STATE HIGHWAY)		
9a	5,000	Temporary trench pavement, (trench width), per linear foot	$10.00	$50,000.00
9b	5,000	Permanent pavement, 1 1/2-inch binder course (trench width), per linear foot	$15.00	$75,000.00
9c	5,000	Permanent pavement, 1 1/2-inch top course (trench width), per linear foot	$15.00	$75,000.00
9d	5,000	Permanent pavement, 4-inch black base course (trench width), per linear foot	$25.00	$125,000.00
9e	5,500	Control density fill, per cubic yard	$75.00	$412,500.00
9f	0	Compaction monitoring/testing, per linear foot	$10.00	$0.00
10		ENVIRONMENTAL PROTECTION		
10a	5,000	Calcium chloride, per pound	$0.25	$1,250.00
10b	200	Siltration control measures, per linear foot	$10.00	$2,000.00
11		GRINDER PUMPS, COMPLETE IN PLACE		
11a	0	Duplex grinder systems, each	$30,000.00	$0.00
11b	0	Simplex grinder systems, each	$10,000.00	$0.00
12		MOBILIZATION		
12a	1	Mobilization, lump sum (not more than 5% of total Eligible bid items 1-11)	$68,596.00	$68,596.00
		TOTAL CONSTRUCTION COST		$1,440,516.00
		CONSTRUCTION CONTINGENCIES (10%)		$144,051.60
		DESIGN, PERMITTING, & CONSTRUCTION SERVICES		$250,000.00
		POLICE DETAILS		$85,000.00
		GRAND TOTAL - GRAVITY SEWER WITH CDF		$1,919,567.60

TABLE 2
ENGINEER'S OPINION OF PROBABLE COST - GRAVITY SEWER WITHOUT CDF

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL AMOUNT
1		SEWERS AND APPURTENANCES, COMPLETE IN PLACE		
1a	5,830	8-inch PVC gravity sewer, 0-12 feet deep, per linear foot	$80.00	$466,400.00
1b	150	Insulation for pipelines, per L.F.	$50.00	$7,500.00
2		PRESSURE SEWERS AND APPURTENANCES		
2a	0	2-inch PVC pressure sewer, per linear foot	$40.00	$0.00
2b	0	Terminal and inline flushing connection and manhole, per structure	$4,000.00	$0.00
3		BUILDING CONNECTIONS		
3a	3	8- x 6-inch wye branches for PVC pipe, each	$250.00	$750.00
3b	0	Tee branches for pressure sewer, each	$200.00	$0.00
3c	0	1 1/2-inch pressure building connections (R.O.W.), per linear foot	$40.00	$0.00
3d	90	6-inch PVC building connections (R.O.W.), per linear foot	$50.00	$4,500.00
4		ROCK EXCAVATION AND DISPOSAL		
4a	250	Rock excavation and disposal, per cubic yard	$100.00	$25,000.00
5		MISCELLANEOUS EARTHWORK		
5a	1,000	Excavation & backfill of unsuitable material, per cubic yard	$25.00	$25,000.00
5b	0	Test Pits, per cubic yard	$50.00	
6		GRAVITY SEWER MANHOLES AND APPURTENANCES		
6a	17	Precast concrete manhole base with standard frame & cover, per manhole	$2,500.00	$42,500.00
6b	136	Precast concrete manhole walls and cones, per vertical foot	$120.00	$16,320.00
7		DEWATERING		
7a	1	Normal Dewatering, lump sum	$10,000.00	$10,000.00
8		PAVEMENT REPLACEMENT (LOCAL STREETS)		
8a	830	Temporary trench pavement, (trench width), per linear foot	$10.00	$8,300.00
8b	830	Permanent pavement, 2-inch binder course (trench width), per linear foot	$15.00	$12,450.00
8c	830	Permanent pavement, 1 1/2-inch top course (trench width), per linear foot	$15.00	$12,450.00
8e	0	Gravel roadway replacement, per linear foot	$10.00	$0.00
9		PAVEMENT REPLACEMENT (STATE HIGHWAY)		
9a	5,000	Temporary trench pavement, (trench width), per linear foot	$10.00	$50,000.00
9b	5,000	Permanent pavement, 1 1/2-inch binder course (trench width), per linear foot	$15.00	$75,000.00
9c	5,000	Permanent pavement, 1 1/2-inch top course (trench width), per linear foot	$15.00	$75,000.00
9d	5,000	Permanent pavement, 4-inch black base course (trench width), per linear foot	$25.00	$125,000.00
9e	0	Control density fill, per cubic yard	$75.00	$0.00
9f	5,000	Compaction monitoring/testing, per linear foot	$10.00	$50,000.00
10		ENVIRONMENTAL PROTECTION		
10a	5,000	Calcium chloride, per pound	$0.25	$1,250.00
10b	200	Siltration control measures, per linear foot	$10.00	$2,000.00
11		GRINDER PUMPS, COMPLETE IN PLACE		
11a	0	Duplex grinder systems, each	$30,000.00	$0.00
11b	0	Simplex grinder systems, each	$10,000.00	$0.00
12		MOBILIZATION		
12a	1	Mobilization, lump sum (not more than 5% of total Eligible bid items 1-11)	$50,471.00	$50,471.00
		TOTAL CONSTRUCTION COST		**$1,059,891.00**
		CONSTRUCTION CONTINGENCIES (10%)		$105,989.10
		DESIGN, PERMITTING, & CONSTRUCTION SERVICES		$250,000.00
		POLICE DETAILS		$85,000.00
		GRAND TOTAL - GRAVITY SEWER WITHOUT CDF		**$1,500,880.10**

TABLE 3

ENGINEER'S OPINION OF PROBABLE COST - PRESSURE SEWER - OPEN CUT WITH CDF

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL AMOUNT
1		SEWERS AND APPURTENANCES, COMPLETE IN PLACE		
1a	0	8-inch PVC gravity sewer, 0-12 feet deep, per linear foot	$80.00	$0.00
1b	0	Insulation for pipelines, per L.F.	$50.00	$0.00
2		PRESSURE SEWERS AND APPURTENANCES		
2a	5,830	2-inch PVC pressure sewer, per linear foot	$40.00	$233,200.00
2b	7	Terminal and inline flushing connection and manhole, per structure	$4,000.00	$28,000.00
3		BUILDING CONNECTIONS		
3a	0	8- x 6-inch wye branches for PVC pipe, each	$250.00	$0.00
3b	2	Tee branches for pressure sewer, each	$200.00	$400.00
3c	60	1 1/2-inch pressure building connections (R.O.W.), per linear foot	$40.00	$2,400.00
3d	0	6-inch PVC building connections (R.O.W.), per linear foot	$50.00	$0.00
4		ROCK EXCAVATION AND DISPOSAL		
4a	150	Rock excavation and disposal, per cubic yard	$100.00	$15,000.00
5		MISCELLANEOUS EARTHWORK		
5a	500	Excavation & backfill of unsuitable material, per cubic yard	$25.00	$12,500.00
5b	0	Test Pits, per cubic yard	$50.00	
6		GRAVITY SEWER MANHOLES AND APPURTENANCES		
6a	0	Precast concrete manhole base with standard frame & cover, per manhole	$2,500.00	$0.00
6b	0	Precast concrete manhole walls and cones, per vertical foot	$120.00	$0.00
7		DEWATERING		
7a	1	Normal Dewatering, lump sum	$10,000.00	$10,000.00
8		PAVEMENT REPLACEMENT (LOCAL STREETS)		
8a	830	Temporary trench pavement, (trench width), per linear foot	$10.00	$8,300.00
8b	830	Permanent pavement, 2-inch binder course (trench width), per linear foot	$15.00	$12,450.00
8c	830	Permanent pavement, 1 1/2-inch top course (trench width), per linear foot	$15.00	$12,450.00
8e	0	Gravel roadway replacement, per linear foot	$10.00	$0.00
9		PAVEMENT REPLACEMENT (STATE HIGHWAY)		
9a	5,000	Temporary trench pavement, (trench width), per linear foot	$10.00	$50,000.00
9b	5,000	Permanent pavement, 1 1/2-inch binder course (trench width), per linear foot	$15.00	$75,000.00
9c	5,000	Permanent pavement, 1 1/2-inch top course (trench width), per linear foot	$15.00	$75,000.00
9d	5,000	Permanent pavement, 4-inch black base course (trench width), per linear foot	$25.00	$125,000.00
9e	3,700	Control density fill, per cubic yard	$75.00	$277,500.00
9f	0	Compaction monitoring/testing, per linear foot	$10.00	$0.00
10		ENVIRONMENTAL PROTECTION		
10a	5,000	Calcium chloride, per pound	$0.25	$1,250.00
10b	200	Siltration control measures, per linear foot	$10.00	$2,000.00
11		GRINDER PUMPS, COMPLETE IN PLACE		
11a	1	Duplex grinder systems, each	$30,000.00	$30,000.00
11b	1	Simplex grinder systems, each	$10,000.00	$10,000.00
12		MOBILIZATION		
12a	1	Mobilization, lump sum (not more than 5% of total Eligible bid items 1-11)	$49,022.50	$49,022.50
		TOTAL CONSTRUCTION COST		**$1,029,472.50**
		CONSTRUCTION CONTINGENCIES (10%)		$102,947.25
		DESIGN, PERMITTING, & CONSTRUCTION SERVICES		$225,000.00
		POLICE DETAILS		$40,000.00
		GRAND TOTAL - PRESSURE SEWER - OPEN CUT WITH CDF		**$1,397,419.75**

TABLE 4

ENGINEER'S OPINION OF PROBABLE COST - PRESSURE SEWER - HDD

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL AMOUNT
1		SEWERS AND APPURTENANCES, COMPLETE IN PLACE		
1a	0	8-inch PVC gravity sewer, 0-12 feet deep, per linear foot	$80.00	$0.00
1b	0	Insulation for pipelines, per L.F.	$50.00	$0.00
2		PRESSURE SEWERS AND APPURTENANCES		
2a	5,830	2-inch PVC pressure sewer (HDD), per linear foot	$50.00	$291,500.00
2b	7	Terminal and inline flushing connection and manhole, per structure	$4,000.00	$28,000.00
3		BUILDING CONNECTIONS		
3a	0	8- x 6-inch wye branches for PVC pipe, each	$250.00	$0.00
3b	2	Tee branches for pressure sewer, each	$200.00	$400.00
3c	60	1 1/2-inch pressure building connections (R.O.W.), per linear foot	$40.00	$2,400.00
3d	0	6-inch PVC building connections (R.O.W.), per linear foot	$50.00	$0.00
4		ROCK EXCAVATION AND DISPOSAL		
4a	0	Rock excavation and disposal, per cubic yard	$100.00	$0.00
5		MISCELLANEOUS EARTHWORK		
5a	0	Excavation & backfill of unsuitable material, per cubic yard	$25.00	$0.00
5b	200	Test Pits, per cubic yard	$50.00	$10,000.00
6		GRAVITY SEWER MANHOLES AND APPURTENANCES		
6a	0	Precast concrete manhole base with standard frame & cover, per manhole	$2,500.00	$0.00
6b	0	Precast concrete manhole walls and cones, per vertical foot	$120.00	$0.00
7		DEWATERING		
7a	0	Nominal Dewatering, lump sum	$10,000.00	$0.00
8		PAVEMENT REPLACEMENT (LOCAL STREETS)		
8a	20	Temporary trench pavement, (trench width), per linear foot	$10.00	$200.00
8b	20	Permanent pavement, 2-inch binder course (trench width), per linear foot	$15.00	$300.00
8c	20	Permanent pavement, 1 1/2-inch top course (trench width), per linear foot	$15.00	$300.00
8e	0	Gravel roadway replacement, per linear foot	$10.00	$0.00
9		PAVEMENT REPLACEMENT (STATE HIGHWAY)		
9a	100	Temporary trench pavement, (trench width), per linear foot	$10.00	$1,000.00
9b	100	Permanent pavement, 1 1/2-inch binder course (trench width), per linear foot	$15.00	$1,500.00
9c	100	Permanent pavement, 1 1/2-inch top course (trench width), per linear foot	$15.00	$1,500.00
9d	100	Permanent pavement, 4-inch black base course (trench width), per linear foot	$25.00	$2,500.00
9e	100	Control density fill, per cubic yard	$75.00	$7,500.00
9f	0	Compaction monitoring/testing, per linear foot	$10.00	$0.00
10		ENVIRONMENTAL PROTECTION		
10a	100	Calcium chloride, per pound	$0.25	$25.00
10b	200	Siltration control measures, per linear foot	$10.00	$2,000.00
11		GRINDER PUMPS, COMPLETE IN PLACE		
11a	1	Duplex grinder systems, each	$30,000.00	$30,000.00
11b	1	Simplex grinder systems, each	$10,000.00	$10,000.00
12		MOBILIZATION		
12a	1	Mobilization, lump sum (not more than 5% of total Eligible bid items 1-11)	$19,456.25	$19,456.25
		TOTAL CONSTRUCTION COST		**$408,581.25**
		CONSTRUCTION CONTINGENCIES (10%)		$40,858.13
		DESIGN, PERMITTING, & CONSTRUCTION SERVICES		$200,000.00
		POLICE DETAILS		$30,000.00
		GRAND TOTAL - PRESSURE SEWER - HDD		**$679,439.38**